Chapter 8 of the book "Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow" delves into the concept of Dimensionality Reduction. It explains the benefits of reducing the number of features in a dataset for data analysis, visualization, and machine learning. The chapter introduces some of the most common techniques for dimensionality reduction, such as projection and manifold learning.

The chapter then moves on to discuss Principal Component Analysis (PCA). The basic idea of PCA is to find the axes that capture the most variance in the data and project the data onto a lower-dimensional subspace. The chapter discusses how to choose the right number of dimensions, how to use PCA for compression and reconstruction, and how to speed up PCA using randomized or incremental algorithms.

Following PCA, the chapter introduces Kernel PCA. It shows how to use a kernel trick to perform nonlinear projections with PCA, which can help preserve clusters or complex manifolds. The chapter explains how to select the best kernel and hyperparameters, and how to use kernel PCA for unsupervised learning tasks such as clustering or anomaly detection.

The chapter also covers Locally Linear Embedding (LLE), another powerful nonlinear dimensionality reduction technique. LLE works by modeling the local linear relationships between instances and then looking for a low-dimensional representation that preserves these relationships. The chapter briefly mentions some other manifold learning algorithms, such as MDS, Isomap, and t-SNE.

Finally, the chapter provides a quick overview of some other popular dimensionality reduction methods, such as Random Projections, Multidimensional Scaling, Isomap, t-SNE, and Linear Discriminant Analysis. It also gives some tips on how to choose the best technique for a given problem. This comprehensive coverage of dimensionality reduction techniques provides a solid foundation for understanding and applying these methods in machine learning.

Géron, A. (2019). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems*. “O’Reilly Media, Inc.”